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Time spent on clerkship activities by students in relation to their perceptions of learning environment quality

Elisabeth A van Hell,¹ Jan B M Kuks² & Janke Cohen-Schotanus¹

CONTEXT Students' perceptions of their learning environment are of great importance to their learning process. In this study we assessed the time allocated by students to clerkship activities and the relationship between students' allocations of time and their perceptions of the quality of their clinical learning environment.

METHODS Participants were 133 undergraduate students from eight hospitals taking part in four clerkship rotations. All students recorded the time they spent on eight clerkship activities over 2 weeks and completed the Postgraduate Hospital Educational Environment Measure (PHEEM). Partial correlation analyses were undertaken to examine the relationship between the amount of time students spent on each activity and their PHEEM scores.

RESULTS Students spent nearly 8 hours a day on clerkship activities. Most time was spent on observing doctors (40%), followed by partici-

pating in consultations without direct supervision (12%). The time students spent on observing doctors ($r = 0.206$, $P < 0.05$) and in consultations without direct supervision ($r = 0.211$, $P < 0.05$) was significantly related to the students' PHEEM scores. There was a significant relationship at the $P < 0.10$ level between the time spent on directly supervised activities and students' PHEEM scores ($r = 0.165$, $P < 0.10$).

CONCLUSIONS The results suggest that the time spent on activities involving direct patient contact is positively related to students' perceptions of the quality of their learning environment. None of the activities were significantly negatively related to the students' perceptions of their clinical learning environment. Future research should examine the optimal time allocations required to enhance the perceived quality of the clinical learning environment.

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INTRODUCTION

The clinical phase is the cornerstone of medical training. After the structured pre-clinical years, medical students enter the less structured clinical phase, which aims to prepare them for their work as independent doctors. During the final clinical phase, student learning outcomes are influenced by interactions between student characteristics, the learning environment and learning activities.^{1,2} However, the relationship between clerkship students' learning activities and their perceptions of the learning environment has not been examined. In the current study we analysed how the amounts of time students spent on eight different clerkship activities were related to the students' perceptions of their clinical learning environment.

The importance of the learning environment as a condition for learning has been widely acknowledged.^{3,4} Different authors have emphasised that it is the environment as interpreted by students which is related to their learning, rather than the objective or nominal environment.⁵ Numerous studies have shown significant associations between students' perceptions of the learning environment and their levels of achievement, satisfaction and success.^{3,4} As a consequence, in medical education, questionnaires have been developed to assess students' perceptions of the learning environment, and both pre-clinical and clinical learning environments have been analysed repeatedly.⁶⁻⁸

Previous descriptive studies of student allocations of time during clerkships have proven to be a useful foundation for mapping student activities in the clerkship environment.⁹⁻¹⁵ Results have shown that students spend considerable time observing doctor-patient consultations and consulting patients under supervision and independently. Additionally, students have recorded time engaged in organised education, study, clinical meetings and unproductive time.⁹⁻¹⁵ A limitation of these studies was that students' time records were gathered over relatively short periods, ranging from 1 day to 1 week. Because research has shown that student allocations of time can vary substantially,¹⁶ the selection of such short periods may have compromised the reliability of these studies. The relationship between the students' actual time allocations and their perceptions of the clinical learning environment remains to be discussed.

To improve the clinical phase of medical education it would be helpful to know whether spending more

time on specific activities is related to a more positive perception of the learning environment. The aim of the present study was to assess the time allocated by students to clerkship activities during 2 consecutive weeks and to determine the relationship between students' allocations of time and their perceptions of the quality of the clinical learning environment.

METHODS

Context and participants

This study was performed at the University of Groningen, the Netherlands. The medical curriculum at Groningen at the time of the study comprised a 6-year, problem-based learning and patient-centred curriculum in which patient problems were the central issue. During Years 5 and 6, students completed six 14-week clerkship rotations at the University Medical Centre Groningen or at one of seven affiliated hospitals. The first four rotations (A-D) were intramural, whereas the students were expected to act more independently outside the hospital setting during the final two rotations. Medical students' clerkship training was organised centrally by the Institute for Medical Education, Faculty of Medicine, University of Groningen. The organisation and structure of rotations, as well as assessment procedures, were identical for every student, independent of rotation and hospital. The heads of education of the participating hospitals met on a monthly basis to deliberate on recent developments, innovations and difficulties. The hospitals involved in this study provided clerkship training to students of the University of Groningen only. The participants ($n = 142$) were students attending any of rotations A in internal medicine, B in psychiatry and neurology, C in surgery and oncology or D in gynaecology and obstetrics, and paediatrics. Participation in this study was voluntary and anonymous and all participants provided informed consent.

Procedure and measures

We developed a paper-based diary on the basis of earlier research into clerkship-student time allocation.⁹⁻¹⁵ During weeks 4 and 5 of their rotations, students were asked to estimate the time in minutes they spent daily on different clerkship activities in the hospital. The following eight clerkship activities were selected for the purposes of the diary:

- 1 structurally organised education, defined as structured education activities for medical students, such as lectures and workshops;
- 2 study, referring to study tasks, such as reading in the library;
- 3 self-directed consultations, relating to consultations carried out without direct observation by clinical staff;
- 4 other self-directed activities, referring to other tasks executed independently without direct observation by clinical staff;
- 5 directly supervised activities, defined as tasks supervised by clinical staff;
- 6 observing doctors, referring to the observing of doctors, such as on the ward or in the outpatient clinic;
- 7 clinical meetings, defined as meetings with clinical staff, and
- 8 unproductive time, defined as seemingly wasted time, such as that caused by waiting or inefficient planning.

Students evaluated the quality of the learning environment of their current rotation by completing the Postgraduate Hospital Educational Environment Measure (PHEEM)⁷ and returned their responses in sealed envelopes. The 40 items on the PHEEM were scored on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). In earlier research the PHEEM was validated by means of exploratory factor analysis and Mokken scale analysis.¹⁷ This study indicated the PHEEM to be a one-dimensional scale, rather than the three subscales originally suggested. The PHEEM score can be determined by calculating the sum of the items after inverting the scores on the negatively formulated statements. Consequently, the PHEEM score ranged from a minimum score of 40 (poor quality) to a maximum score of 200 (excellent quality).

Statistical analysis

Time allocation was calculated by summing the total time in minutes spent on each activity over the recorded 2-week period. The corresponding standard deviation (SD) and percentages of total time for each activity were also determined. The mean PHEEM scores and SDs were determined and possible differences between hospitals or rotations, as well as gender differences, were analysed by means of a one-way ANOVA. In addition, the reliability (Cronbach's α) of the PHEEM was calculated.

Partial correlation analyses were performed to examine the relationship between the total time spent on

each respective activity by students and their PHEEM scores, while controlling for the effects of the other seven time measures. This enabled unique relationships between one time measure and the students' PHEEM scores to be determined while holding constant the effects of the other time measures.

RESULTS

In total, 133 (94%) students completed the diary and the PHEEM accurately. Of the respondents, 75% were female, which corresponded to the overall gender distribution among medical students in the faculty. Eighteen students (14%) were in rotation A, 52 (39%) in rotation B, 30 (23%) in rotation C and 32 (24%) in rotation D. One student did not indicate his or her rotation. The number of students per hospital varied between eight (6%) and 23 (17%). Table 1 shows the mean total time students spent on each clerkship activity over the 2-week period and the corresponding SD. The mean time students spent on all activities was nearly 8 hours (473 minutes) per day. By far, the most time allocated on average by students was spent on observing doctors (40%). Much less time was spent on self-directed consultations (12%) and directly supervised activities (6%). A total of 7% of the time was recorded as unproductive. The mean PHEEM score was 147.64 (SD = 18.17), which suggests that, on average, students perceived the quality of their learning environment in a positive light. The reliability of the PHEEM was 0.90 (Cronbach's α). Using a one-way ANOVA, non-significant mean differences in PHEEM scores were found between hospitals, rotations and gender.

Table 1 Mean time, standard deviations (SDs) and percentages of total time spent in hospital for 2 weeks

| | Time, minutes | SD | Percentage |
|----------------------------------|------------------|-----|------------|
| Structurally organised education | 283 | 26 | 6 |
| Study | 399 | 32 | 8 |
| Self-directed consultations | 558 | 47 | 12 |
| Other self-directed activities | 522 | 51 | 11 |
| Directly supervised activities | 297 | 18 | 6 |
| Observing doctors | 1872 | 103 | 40 |
| Clinical meetings | 489 | 39 | 10 |
| Unproductive time | 314 | 23 | 7 |

Table 2 Partial correlations between total time measure and score on the Postgraduate Hospital Educational Environment Measure (PHEEM) score, controlling for other time measures

| | Partial correlations PHEEM score | P-value |
|----------------------------------|-------------------------------------|---------|
| Structurally organised education | 0.080 | 0.373 |
| Study | 0.134 | 0.135 |
| Self-directed consultations | 0.211* | 0.018 |
| Other self-directed activities | 0.056 | 0.532 |
| Directly supervised activities | 0.165 | 0.065 |
| Observing doctors | 0.206* | 0.020 |
| Clinical meetings | - 0.131 | 0.143 |
| Unproductive time | - 0.045 | 0.618 |

* $P < 0.05$

Results from the partial correlation analyses showed that the time students spent observing doctors ($r = 0.206$, $P < 0.05$) and on self-directed consultations ($r = 0.211$, $P < 0.05$) were both significantly related to students' PHEEM scores (Table 2). There was a significant relationship at the $P < 0.10$ level between the time spent on directly supervised activities and the students' PHEEM scores ($r = 0.165$, $P < 0.10$). No significant negative relationship was found between student allocations of time to clerkship activities and student perceptions of the quality of the clinical learning environment.

DISCUSSION

This study examined the time allocated by students to a variety of clerkship activities and the relationship between this allocation and student perceptions of the quality of their learning environments. Results showed that, of the nearly 8 hours a day spent on clerkship activities recorded in this study, most time was spent observing doctors. Considerably less time was allocated to self-directed consultations, other self-directed activities and clinical meetings. A total of 6% of the time was spent on clerkship activities directly supervised by clinical staff. A positive relationship was found between the time students allocated to the activities of observing doctors, self-directed consultations and directly supervised activities, and their perceptions of the quality of their clinical learning environment. These results suggest that time spent

on activities involving direct patient contact is positively related to students' perceptions of the quality of their learning environment.

The relationship between students' time allocation and their perception of the clinical learning environment must be analysed with caution. It may be that spending considerable amounts of time on activities involving direct patient contact made students feel more positive about their learning environment. This would imply that, in order to create a positive learning environment, it is important to ensure that students spend considerable time on clerkship activities involving direct patient contact. An alternative interpretation would be that students' initial positive perceptions of their learning environment made them choose to spend more time on activities with direct patient contact. Therefore, the presented correlations should not be interpreted as causal. Further research is needed to explore possible causality.

Apart from eventual causality, the question arises as to whether students should only spend time on activities involving direct patient contact. We do not call for such a structuring of students' clerkship activities. None of the activities were significantly negatively related to students' perceptions of their clinical learning environment. Although time spent on these activities showed no significant relationship to students' perceptions of their learning environment, it may serve other useful functions. Structurally organised education, study time, clinical meetings and other self-directed activities are likely to be necessary to provide students with training in knowledge and skills which cannot be taught in the presence of a patient, but which facilitate their learning when engaged in direct patient contact. Furthermore, attending clinical meetings and performing routine work form a substantial part of a doctor's working day, experience of which is likely to assist students in becoming fully involved in the daily practice of the clinical working environment. However, it seems important to ensure that every student spends considerable time on clerkship activities involving direct patient contact.

Although time spent on directly supervised activities and students' perceptions of their learning environment were positively correlated, it was remarkable that the correlation did not reach significance at the 0.05 level. This finding was inconsistent with previous research, which suggested supervised interaction with patients had more educational value than other activities.¹² The difference between findings

may be explained by the quality of feedback given during directly supervised activities. It may be that the instructiveness of feedback related to the perceived quality of the learning environment more closely than the amount of time spent on supervised activities.¹⁸ However, further research might clarify this relationship.

It has been widely acknowledged that students learn more by doing things themselves, rather than by observing others. Therefore, it was remarkable that the correlation between students' PHEEM scores and time allocated to self-directed consultations did not exceed the correlation between students' PHEEM scores and time allocated to observing doctors. However, undergraduate students with relatively little experience might benefit from doing things themselves as well as from observing others. The outcome which revealed that students spent considerable time observing doctors was consistent with previous research.^{10,12,14} So too was the finding that 7% of time was spent unproductively.^{10,12,13} A previous Dutch study revealed a negative correlation between the time spent on non-instructive activities and the perceived effectiveness of the rotation.¹³ The present study also revealed a negative relationship between time recorded as unproductive and students' perceptions of their learning environment, although the small negative correlation was not significant. It may be that some students were comfortable with having some unorganised time and may have partly used these moments to process their clerkship experiences. Our finding that students spent an average total of 8 hours a day engaged in clerkship activities in the hospital shows that they spent considerably less time on these than reported by students in studies performed outside the Netherlands.^{9,11,14} It is likely that this difference reflects the result of a Dutch political decision, taken several years ago, that resulted in strict regulations requiring hospital staff to work a maximum 46-hour week. The reported 8 hours a day fits in with this regulation and corresponds to our expectations.

Recently, between-hospital differences in learning environments have been reported.¹⁹ In our study no significant differences were found between hospitals, rotations and gender, although enough students participated in our study to determine differences in PHEEM scores.¹⁷ This may have resulted from the fact that the clerkship training of all students was centrally organised, the heads of education of all participating hospitals met on a regular basis, and all participating hospitals provided clerkship training to students from the same university. This regulari-

sation may have resulted in the relative homogeneity of the hospitals in terms of their clinical learning environments. Another possible explanation refers to the one-dimensional scale structure of the PHEEM applied in this study. Use of the total PHEEM scores may have caused possible item-level differences to cancel one another out. The utility of instruments with a one-dimensional scale structure is limited when the outcomes are used 'for managing environmental change'.²⁰ However, the use of one score, which represented the quality of the clinical learning environment as a whole, was compatible with the aim of the present study.

The multi-site and multidisciplinary design of this study, in which measurements were gathered from eight hospitals and in four clerkship rotations involving several disciplines, is likely to have substantially enhanced the generalisability of our findings. Participating students recorded their clerkship activities daily over an uninterrupted period of 2 weeks, which is longer than the periods employed in previous research.⁹⁻¹⁵ Because student allocations of time have been found to vary substantially,¹⁶ this longer period is likely to have provided more reliable outcomes. Nevertheless, the relatively high SDs found in this study confirm previous findings of high variability between students.¹⁶ A possible limitation of the study was the use of self-reports to determine the amount of time allocated to clerkship activities. Students may have misjudged these times. For instance, students may have overestimated the time spent on activities they perceived as being boring or tiresome, or underestimated the time they spent on activities in which they were fully absorbed. However, that the activity measures occurred across an average of 8 working hours a day is likely to have mitigated the effects of this limitation.

Further research is needed to explore why the time spent on directly supervised activities showed only a marginal relationship with students' perceptions of their clinical learning environment. Furthermore, provision of a more extensive diary to record the content of the activities may provide more specific information that might explain why the time recorded as unproductive did not show a significant negative relationship with the perceived quality of the learning environment. Finally, research is required to determine the generalisability of the present study's findings to other university clerkship settings and to examine the optimal time allocation required to enhance the perceived quality of the clinical learning environment.

Contributors: EAvH was responsible for conducting the study and writing the manuscript. JBMK and JC-S supervised the study, were involved in the conceptualising process and made critical revisions. All authors contributed to the interpretation of the results, commented on several drafts of the manuscript and approved the final version of the paper.

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REFERENCES

- Biggs J. *Teaching for Quality Learning at University*, 2nd edn. Buckingham: Open University Press 2003;11–32.
- Dornan T, Boshuizen H, King N, Scherpbier A. Experience-based learning: a model linking the processes and outcomes of medical students' workplace learning. *Med Educ* 2007;**41**:84–91.
- Roff S. Education environment: a bibliography. *Med Teach* 2005;**27**:353–7.
- Fraser BJ. Science learning environments: assessment, effects and determinants. In: Fraser BJ, Tobin KG, eds. *International Handbook of Science Education*. Dordrecht: Kluwer Academic Publishers 1998;527–64.
- Lowyck J, Elen J, Clarebout G. Instructional conceptions: analysis from an instructional design perspective. *Int J Educ Res* 2004;**41**:429–44.
- Roff S, McAleer S, Harden RM, Al-Qahtani M, Ahmed AU, Deza H, Groenen G, Primparyon P. Development and validation of the Dundee Ready Education Environment Measure (DREEM). *Med Teach* 1997;**19**:295–9.
- Roff S, McAleer S, Skinner A. Development and validation of an instrument to measure the postgraduate clinical learning and teaching educational environment for hospital-based junior doctors in the UK. *Med Teach* 2005;**27**:326–31.
- Nagraj S, Wall D, Jones E. Can STEEM be used to measure the educational environment within the operating theatre for undergraduate medical students? *Med Teach* 2006;**28**:642–7.
- Cook RL, Noecker RJ, Suits GV. Time allocation of students in basic clinical clerkships in a traditional curriculum. *Acad Med* 1992;**67**:279–81.
- Lawrence SL, Mark DH, Fulkerson PK, Cohen R. Students' time allocation in a required third-year ambulatory care clerkship. *Acad Med* 1994;**69**:60–1.
- O'Sullivan PS, Weinberg E, Boll AG, Nelson TR. Students' educational activities during clerkship. *Acad Med* 1997;**72**:308–13.
- Murray E, Alderman P, Coppola W, Grol R, Bouhuijs P, van der Vleuten C. What do students actually do on an internal medicine clerkship? A log diary study. *Med Educ* 2001;**35**:1101–7.
- Dolmans DHJM, Wolfhagen HAP, Essed GGM, Scherpbier AJJA, van der Vleuten CPM. Students' perceptions of time spent during clinical rotations. *Med Teach* 2001;**23**:471–5.
- Bloomfield L, Harris P, Hughes C. What do students want? The types of learning activities preferred by final year medical students. *Med Educ* 2003;**37**:110–8.
- Worley P, Prideaux D, Strasser R, March R, Worley E. What do medical students actually do on clinical rotations? *Med Teach* 2004;**26**:594–8.
- van der Vleuten CPM, Scherpbier AJJA, Dolmans DHJM, Schuwirth LWT, Verwijnen GM, Wolfhagen HAP. Clerkship assessment assessed. *Med Teach* 2000;**22**:592–600.
- Boor K, Scheele F, van der Vleuten CPM, Scherpbier AJJA, Teunissen PW, Sijtsma K. Psychometric properties of an instrument to measure the clinical learning environment. *Med Educ* 2007;**41**:92–9.
- van Hell EA, Kuks JBM, Raat AN, van Lohuizen MT, Cohen-Schotanus J. Instructiveness of feedback during clerkships: influence of supervisor, observation and student initiative. *Med Teach* 2009;**31**:45–50.
- Boor K, Scheele F, van der Vleuten CPM, Teunissen PW, Breejen EME, Scherpbier AJJA. How undergraduate clinical learning climates differ: a multi-method case study. *Med Educ* 2008;**42**:1029–36.
- Schönrock-Adema J, Heijne-Penninga M, van Hell EA, Cohen-Schotanus J. Necessary steps in factor analysis: enhancing validation studies of educational instruments. The PHEEM applied to clerks as an example. *Med Teach* [Epub ahead of print].

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